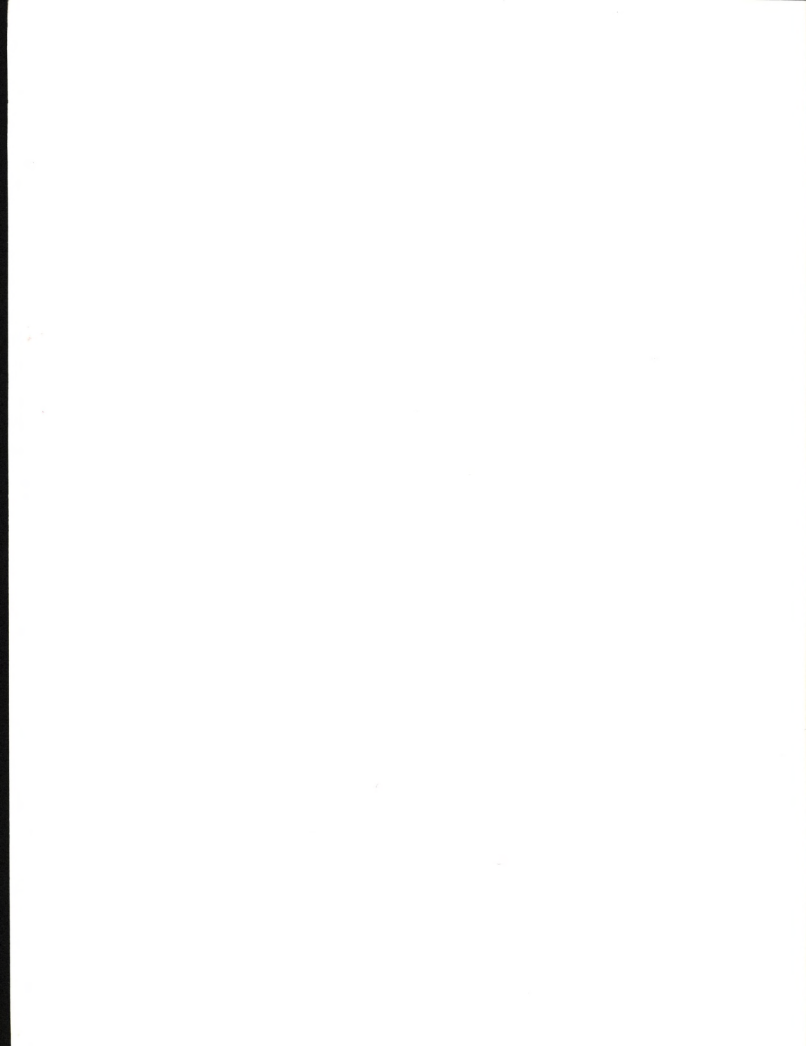




A TREE IS GROWING



by ARTHUR DORROS
illustrated by S. D. SCHINDLER





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The illustrations were etched with a stylus and filled with colored pencil on parchment and pastel papers.

The text type was set in Garamond.

Pictured on the back jacket are
Striped maple leaves and flowers.

Book design by Kristina Iulo

Special thanks to Gregory J. Waters,
botanist, horticulturist, and Director of Highstead Arboretum,
Redding, Connecticut, for his expert advice on trees.

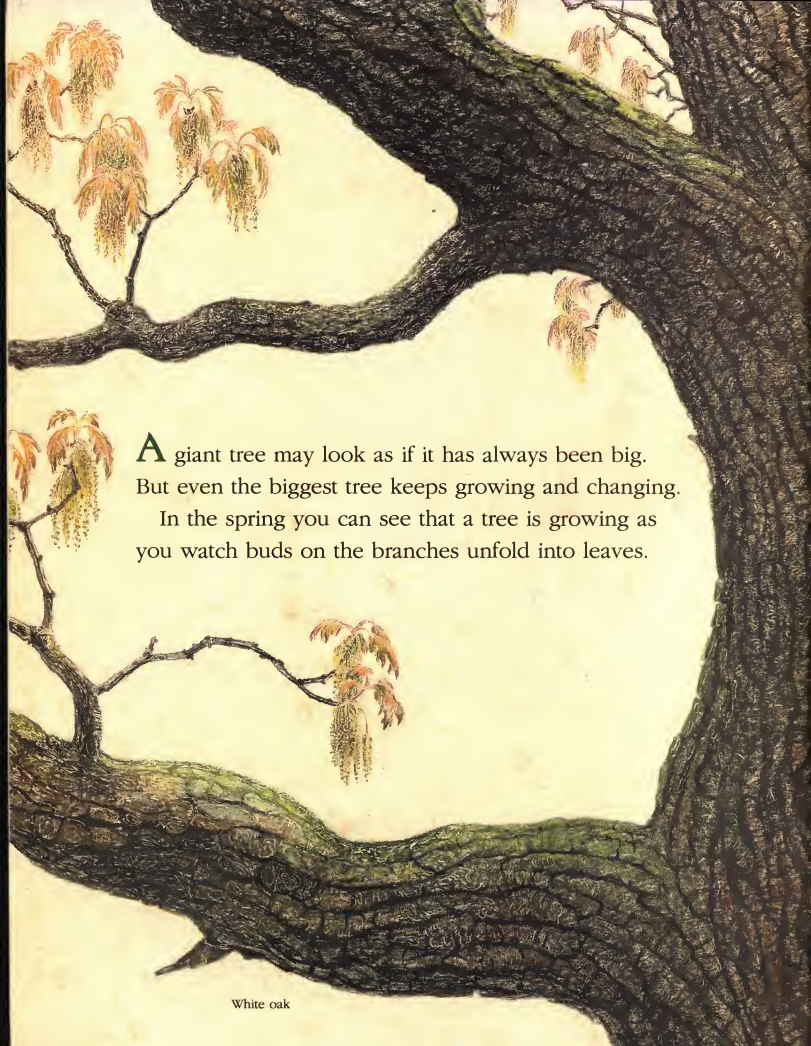
To Sam, Sidney, Harriet and Sandy,
and the rest of my family tree

A.D.



To Phoebe Yeh and Kristina Iulo

S.D.S.



A giant tree may look as if it has always been big.
But even the biggest tree keeps growing and changing.

In the spring you can see that a tree is growing as
you watch buds on the branches unfold into leaves.



Bristlecone pines are the oldest known living trees on earth. Some have been growing for five thousand years — since before the pyramids in Egypt were built.



With help from sunlight, leaves use tiny particles of gas from the air, and water from the ground, to make a kind of sugar. People breathe in oxygen and breathe out carbon dioxide gases. Tree leaves "breathe in" carbon dioxide gas from people, cars, and smoke, and release to the air oxygen that people need.



This process is called *photosynthesis*.





White oak



Palm

Leaves can be skinny needles or big heart shapes.
Whatever shape or size a leaf is, it makes food for the tree.

A kind of sugar is made in the leaves. Trees use the
sugar as food.

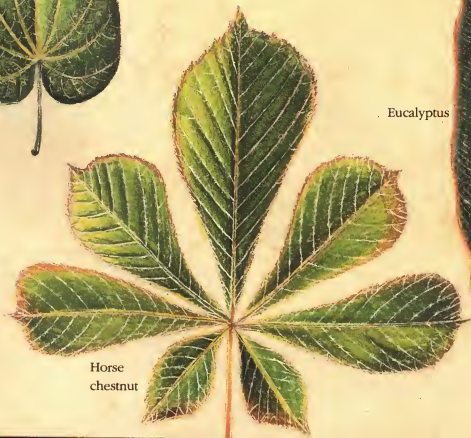


Orchid tree

Breadfruit
tree



Eucalyptus



Horse
chestnut



Red maple

The sugary water made in the leaves is mixed with other tree juices called sap. The food in the sap is carried throughout the tree. Where a branch breaks or where bark is cut, sap oozes out of a tree. The strong smells of some saps can keep insects from eating the trees they live on.

A detailed illustration of a white pine branch with several clusters of long, green needles. The branch is dark brown and textured. In the lower right, a large wood nymph butterfly is perched on the bark, showing brown and orange patterns. The background is a light, textured cream color.

White pine

Large
wood nymph
butterfly



*If you rub a sassafras
leaf, the sap smells
spicy.*



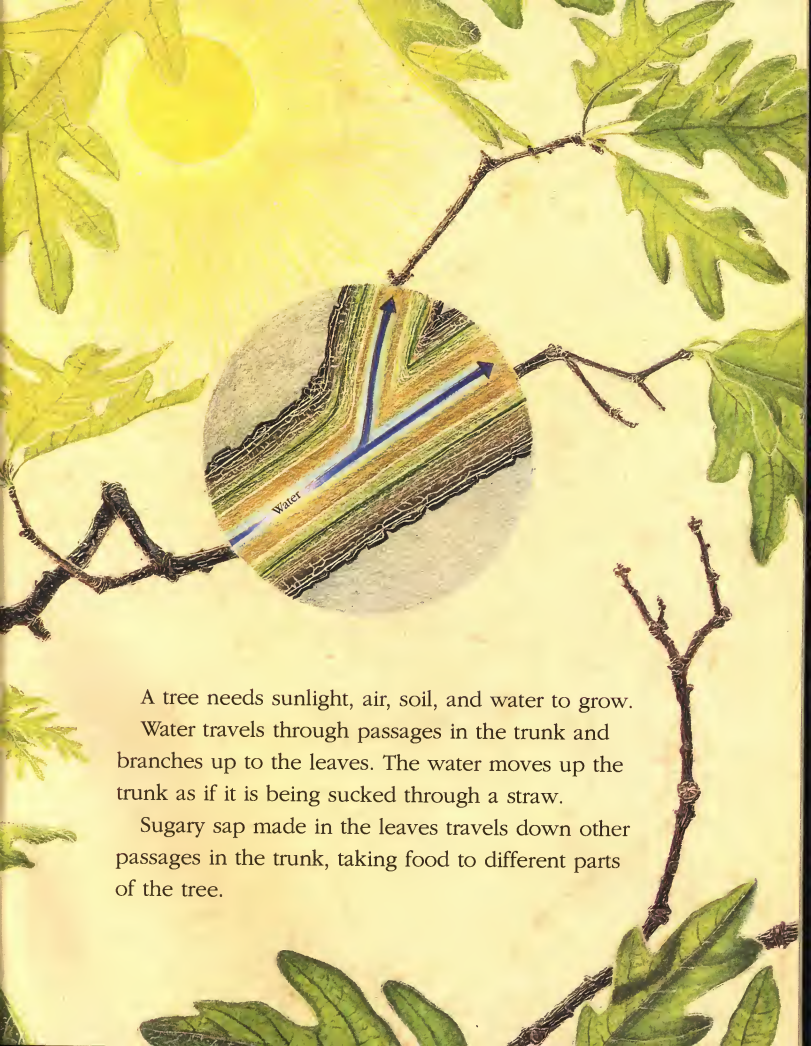
*Maple syrup is the boiled
sap of sugar maple trees.*



Baobab trees store water in the trunks. When a baobab tree trunk is swollen with water, it is round and fat. In dry weather, the tree gets water from the trunk. Then the trunk gets thinner.



Moth
caterpillar



A tree needs sunlight, air, soil, and water to grow. Water travels through passages in the trunk and branches up to the leaves. The water moves up the trunk as if it is being sucked through a straw.

Sugary sap made in the leaves travels down other passages in the trunk, taking food to different parts of the tree.

*A few kinds of trees
drop roots from branches
into the soil to gather
water. Banyan tree roots
grow into columns all
around the tree.*

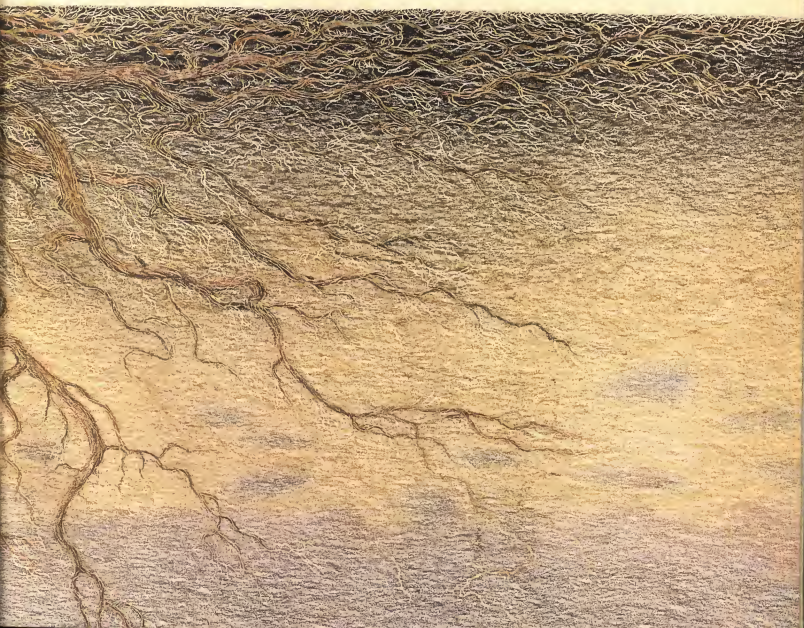


White oak



The roots of a tree grow into the ground and hold the tree in place. Roots are like pipelines. They absorb water and carry it into the tree.

A tree's roots spread out far underground. They usually grow out a little farther than the tree's branches.



Trees need minerals to grow. Minerals are tiny particles that are found in the soil. Salt is one kind of mineral. Like salt, other minerals dissolve in water. They are mixed in with the water that roots absorb and are carried throughout the tree.

Mushrooms growing among the roots of a tree can help it get minerals. And the mushrooms and plants growing near a tree get water brought by the tree's roots.

An artistic illustration of a forest floor. In the center, a cluster of cinnabar-red chanterelle mushrooms with white stems grows from a patch of light-colored soil. To the right, a large, bicolored boletus mushroom with a red cap and yellow-green stem is partially visible. The foreground is dominated by a dense network of dark brown tree roots. The background is a plain, light-colored sky.

Cinnabar-red
chanterelle
mushrooms

Bicolored
boletus
mushrooms



Earthworms

Beetle grub



Robin

Growing roots are strong. A root can lift a sidewalk or split a rock as it grows. By splitting the rock, it helps make soil.



Flicker

Bark is the skin of a tree. The outer layer of bark protects the tree. When an oak tree is young, the bark is as smooth as a baby's skin. As the tree grows older, the bark becomes rough and cracked.

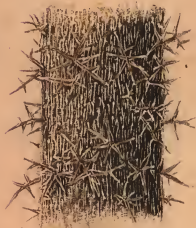
Polyphemus
moth



*Looking at the bark
of a tree can help
you know what kind
of tree it is.*



*The cork used for
bulletin boards is the
peeled-off outer bark
of a cork oak tree.*

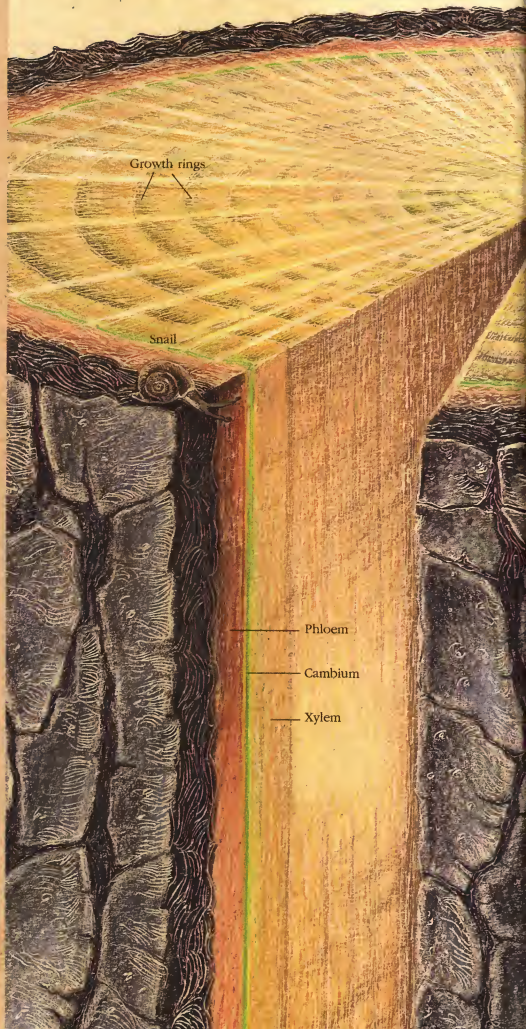


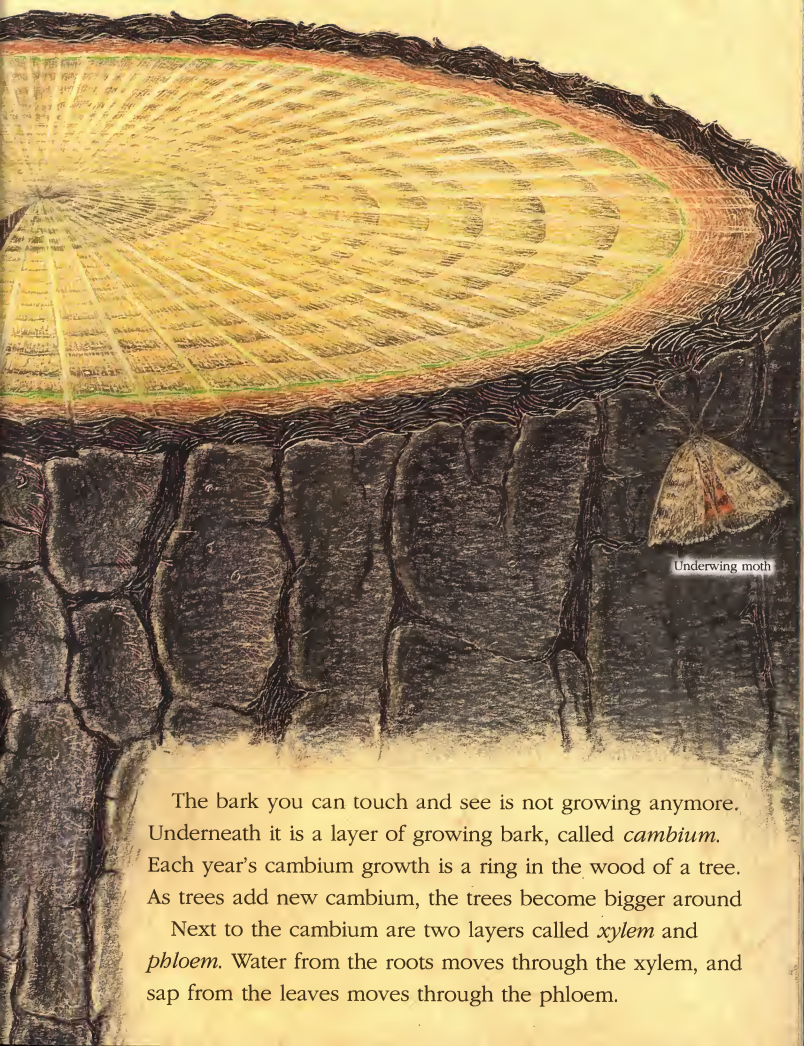
*Honey locust bark
has spines to help
protect the tree.*

*In cool climates,
cambium only grows
in spring and summer.
Count growth rings to see
how old a tree was when
it died. An old fir tree
can have over a
thousand rings, one
for each year it lived.*



*In tropical rain forest
trees, the cambium grows
all year and there are no
rings. It is hard to tell the
ages of those trees.*





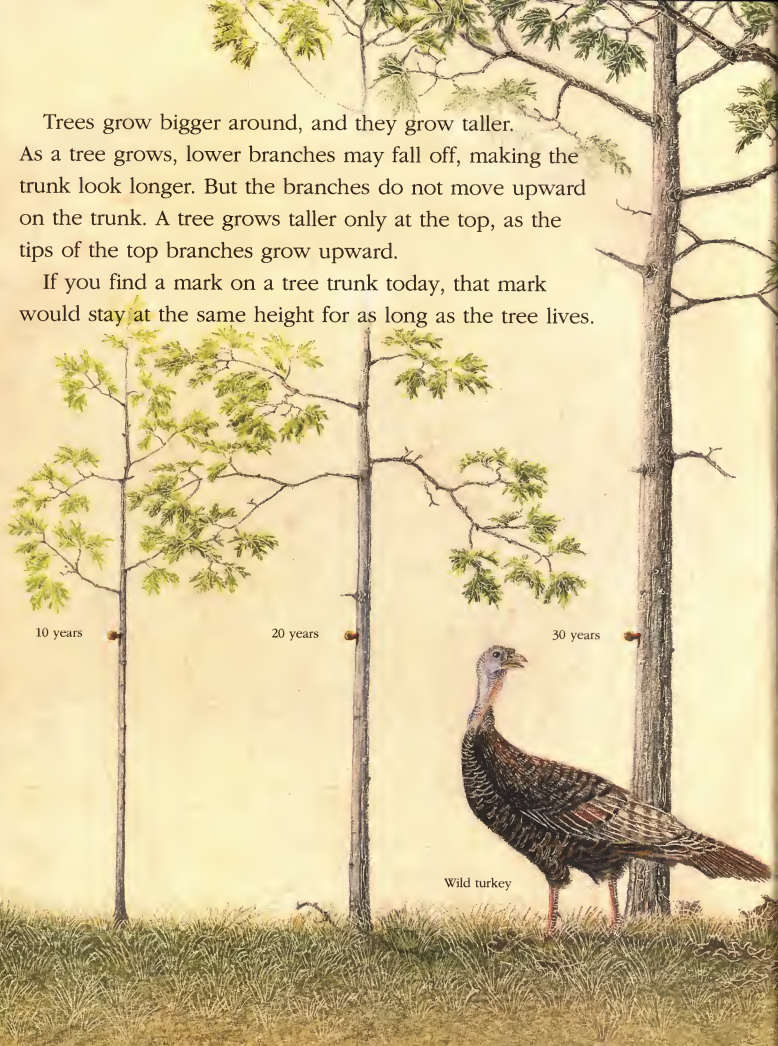
Underwing moth

The bark you can touch and see is not growing anymore. Underneath it is a layer of growing bark, called *cambium*. Each year's cambium growth is a ring in the wood of a tree. As trees add new cambium, the trees become bigger around

Next to the cambium are two layers called *xylem* and *phloem*. Water from the roots moves through the xylem, and sap from the leaves moves through the phloem.

Trees grow bigger around, and they grow taller. As a tree grows, lower branches may fall off, making the trunk look longer. But the branches do not move upward on the trunk. A tree grows taller only at the top, as the tips of the top branches grow upward.

If you find a mark on a tree trunk today, that mark would stay at the same height for as long as the tree lives.



*Sequoias are some of
the tallest trees in the
world — over three
hundred feet tall.*





Nectar-eating
bat

Calabash tree



Catkin

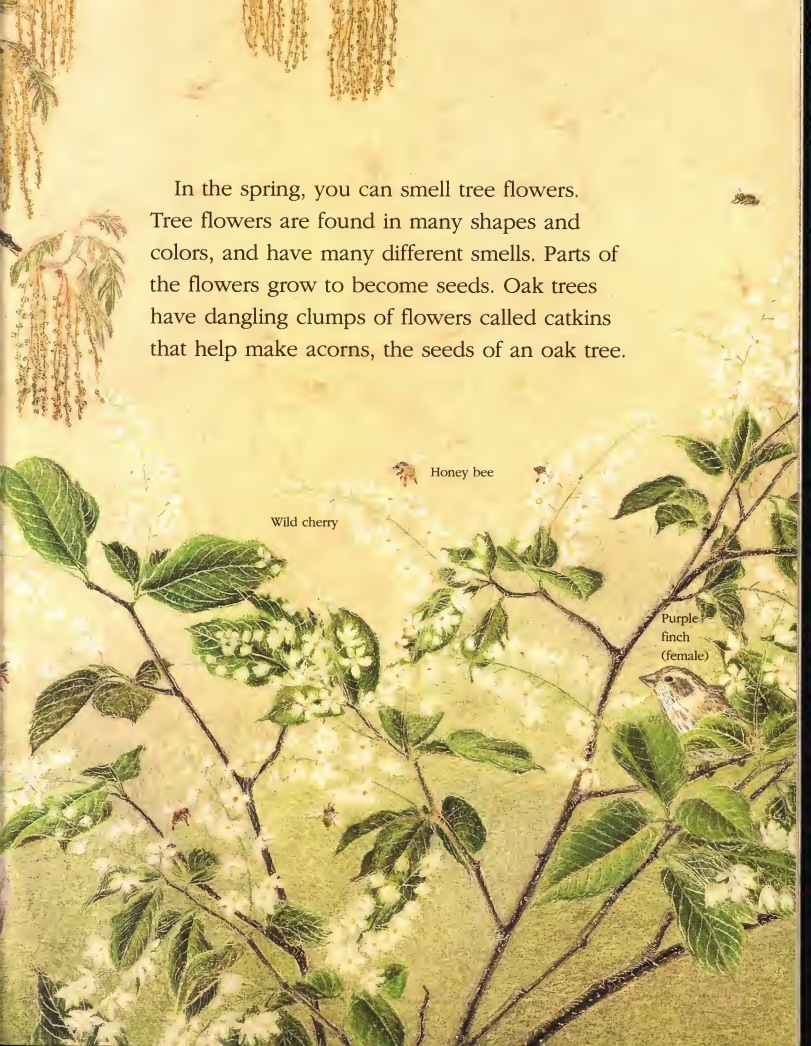


Purple finch
(male)



Saucer
magnolia

Birds, insects, and even bats are attracted to flowers to drink their sweet juices. When they brush the flowers, the animals get a powder called pollen on them. The animals carry the pollen to other flowers. When the pollen mixes with certain parts of the flowers, seeds grow. Wind also helps pollinate flowers.



In the spring, you can smell tree flowers. Tree flowers are found in many shapes and colors, and have many different smells. Parts of the flowers grow to become seeds. Oak trees have dangling clumps of flowers called catkins that help make acorns, the seeds of an oak tree.

Wild cherry

Honey bee

Purple
finch
(female)



Sugar maple

An oak tree can drop more than fifty thousand acorns in one year. Only a few of them grow into oak trees. Most are eaten, crushed, rot, or land in a place where they cannot take root.

Acorns can be carried away and dropped or buried by animals to grow in new places. Other kinds of seeds blow in the wind or float on water.

Sugar maple
seed

Acorns



Gray
squirrel

*Different kinds of
trees make seeds with
different coverings.
Nuts, cones, and fruits
all have seeds inside.*

Brazil nut



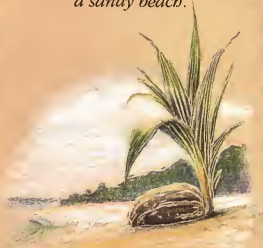
Mountain
pine cone



Cherry



*Coconuts are seeds of
a palm tree. A coconut
can float across the
ocean and sprout on
a sandy beach.*



*Autumn is a great time
to collect leaves.
Each tree has its own
special color.*



Tulip poplar



Ginkgo



Big-tooth
aspen



Sweet
gum



Pin oak



Titmouse

Sugar maple

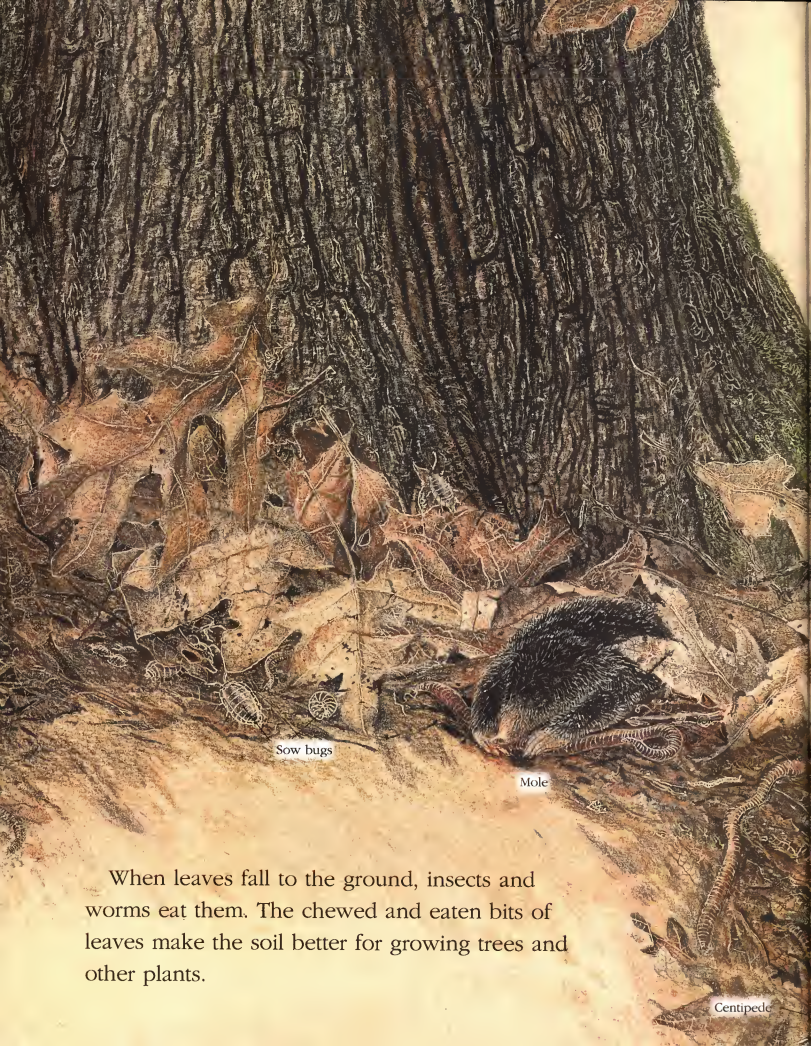


White oak

Nuthatch

In cool climates, trees stop growing in autumn. The leaves of many trees stop making sugary food for the tree, and they lose their green color. Then you can see the red, brown, yellow, and orange colors that are also in the leaves.

Pine trees and some other trees have needles or leaves that do not change color in autumn.



Sow bugs

Mole

When leaves fall to the ground, insects and worms eat them. The chewed and eaten bits of leaves make the soil better for growing trees and other plants.

Centipede



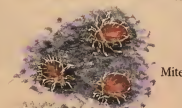
*In one small spoonful
of soil, there can be
hundreds of strange-
looking living things that
eat the fallen leaves.
Many of the animals are
too tiny to see, except
with a microscope.*



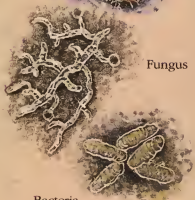
Springtails



Nematodes



Mites



Fungus

Bacteria



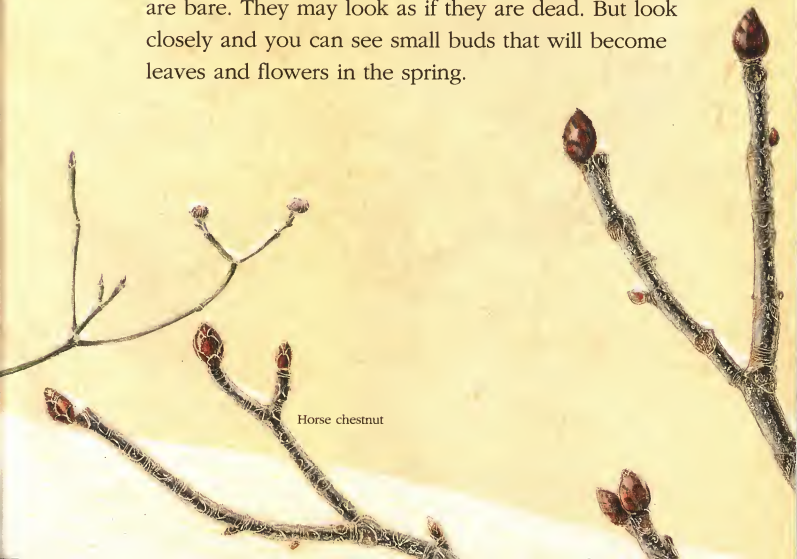
Screech owl

Dogwood



White oak

Trees rest in the cold of winter, and their branches are bare. They may look as if they are dead. But look closely and you can see small buds that will become leaves and flowers in the spring.



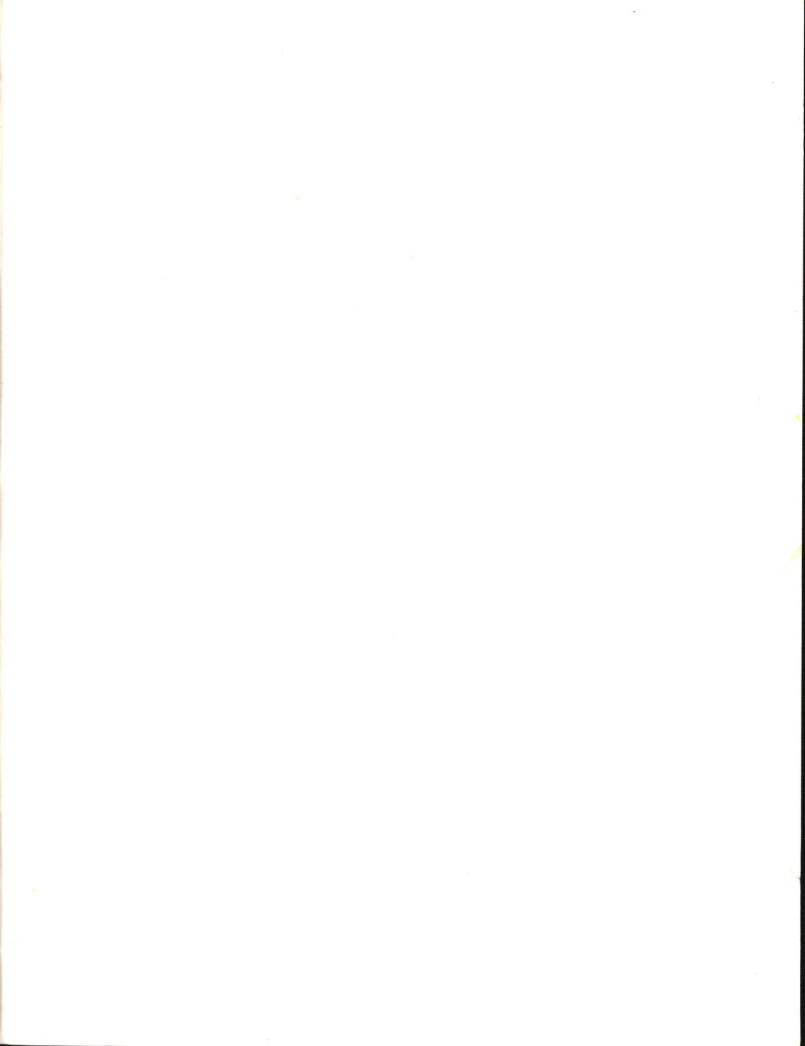
Horse chestnut

In the spring, listen to the wind rustling
the leaves.

The trees are growing again.



White oak





See how an oak tree grows through the seasons.

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